

**Application No.: 10/560,589**

**REMARKS**

**I. Introduction**

In response to the final Office Action dated February 18, 2010, Applicants have amended claim 1 to further clarify the subject matter of the present disclosure. Support for the amendment to claim 1 may be found, for example, on page 33, lines 18-24 and page 34, lines 2-11 of the specification. Applicants have been careful to avoid the introduction of new matter.

For the reasons set forth below, Applicants respectfully submit that all pending claims are patentable over the cited prior art references.

**II. The Rejection of Claims 1-5 And 10 Under 35 U.S.C. § 102 is Traversed**

Claims 1-3, 5 and 10 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Seo (US 2002/0053871). Applicants respectfully submit that Seo does not anticipate the pending claims for at least the following reasons.

Amended independent claim 1 recites a light-emitting device comprising a first electrode, a second electrode provided to be opposite to the first electrode, and a light-emitting layer which contains a metal oxide semiconductor porous body. The surface of the metal oxide semiconductor porous body supports an organic light-emitting material, and is provided between the first electrode and the second electrode. A functional group in the organic light-emitting material is esterified with a hydroxyl group (-OH) existing on the surface of the metal oxide semiconductor porous body to immobilize the organic light-emitting material, such that the organic light-emitting material is chemisorbed to the surface of the metal oxide semiconductor porous body. The functional group is selected from the group consisting of a carbonyl group (-

**Application No.: 10/560,589**

COOH), a thiocarboxyl group (-CSOH), a dithiocarboxyl group (-CSSH), a sulfo group (-SO<sub>3</sub>H), a sulfinio group (-SO<sub>2</sub>H), a sulfeno group (-SOH), a phosphono group (-PO(OH)<sub>2</sub>), a phosphine group (-PH<sub>2</sub>O<sub>2</sub>), a mercapto group (-SH) a trimethoxysilyl group (-Si(OCH<sub>3</sub>)), a trichlorosilyl group (-SiCl<sub>3</sub>), an amide group (-CONH<sub>2</sub>), and amino group (-NH<sub>2</sub>).

One feature of the present disclosure is the organic light-emitting material contains a functional group that is esterified with a hydroxyl group (-OH) existing on the surface of the metal oxide semiconductor porous body to immobilize the organic light-emitting material. The organic light-emitting material is chemisorbed to the surface of the metal oxide semiconductor porous body. As a result of this feature, the light-emitting device is prevented from being deteriorated due to the separation of the organic material from the surface of the metal oxide semiconductor porous body at the interface between the porous body and the electrode.

In contrast, Seo merely teaches that the metal alkoxide is chemisorbed via dip coating or spin coating onto a metal. For example, Seo teaches, in paragraphs [0021] and [0079]-[0083] that the anodization processing is performed using the formed Ta film as an anode in an oxalic acid solution to form an oxide film 403. The oxide film 403 is composed of a porous layer 403a having pores vertical to the film surface and a barrier layer 403b. The luminescent layer 404 is formed by spin coating or dip coating using a PPV derivative solution in which the PPV derivative is dissolved in toluene.

It is alleged in the Response to Arguments that spin coating or dip coating of Seo is substantially identical to Applicants' methods of forming the light emitting layer, as shown in paragraph [0199] of US 2007/0007538. However, the cited passage merely recites conventional methods for forming a layer, such as ink-jet, dip coating, spin coating, and the like.

**Application No.: 10/560,589**

As indicated above, independent claim 1 has been amended to disclose an esterification step that cannot be carried out by spin coating or dip coating. As such, regardless of the passage recited by the Examiner, amended independent claim 1 does not include dip coating or spin coating methods. Therefore, Seo does not disclose chemisorption via esterification using a hydroxyl group reacted with the various functional groups listed in amended claim 1 of the present disclosure. Thus, it is clear that Seo fails to teach or suggest all of the limitations of amended independent claim 1 of the present disclosure.

Anticipation under 35 U.S.C. § 102 requires that each and every element of the claim be disclosed, either expressly or inherently in a prior art reference, *Akzo N.V. v. U.S. Int'l Trade Commission*, 808 F.2d 1471 (Fed. Cir. 1986). At a minimum, for the reasons set forth above, Seo does not disclose light-emitting device comprising a first electrode; a second electrode provided to be opposite to the first electrode; and a light-emitting layer which contains a metal oxide semiconductor porous body, by the surface of which an organic light-emitting material is supported, and is provided between the first electrode and the second electrode, wherein the organic light-emitting material contains a functional group that is esterified with a hydroxyl group (-OH) existing on the surface of the metal oxide semiconductor porous body to immobilize the organic light-emitting material, such that the organic light-emitting material is chemisorbed to the surface of the metal oxide semiconductor porous body. Therefore, as it is apparent from the foregoing that Seo fails to anticipate amended claim 1 or any dependent claims thereon, Applicants submit that amended claim 1 is allowable and patentable over the prior art. As such, Applicants respectfully request that the § 102 rejection of claim 1 be withdrawn.

Moreover, Roitman, which is relied upon in the § 103 rejection of claims 6-9, does not, and is not relied upon to remedy this deficiency. Roitman discloses, in Fig. 4 and paragraph

**Application No.: 10/560,589**

[0023], an organic polymer based electroluminescent device includes a hole transport layer (HTL)(308) having a mixture of glass beads 310 and PEDOT, the hole transport layer (HTL)(308) acting as a spacing layer. However, Roitman does not disclose that the organic light-emitting material is chemisorbed via esterification to the surface of a metal oxide.

**III. All Dependent Claims Are Allowable Because The Independent Claim From Which They Depend Is Allowable**

Under Federal Circuit guidelines, a dependent claim is nonobvious if the independent claim upon which it depends is allowable because all the limitations of the independent claim are contained in the dependent claims, *Hartness International Inc. v. Simplimatic Engineering Co.*, 819 F.2d at 1100, 1108 (Fed. Cir. 1987). Accordingly, as claim 1 is patentable for the reasons set forth above, it is respectfully submitted that all pending dependent claims are also in condition for allowance. Therefore, Applicants respectfully request that the § 102 rejection of claims 2, 3, 5 and 10 and the § 103 rejection of claims 6-9 and 11-14 be withdrawn.

**IV. Conclusion**

Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication of which is respectfully solicited.

**Application No.: 10/560,589**

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



Nathaniel D. McQueen

Registration No. 53,308

600 13<sup>th</sup> Street, N.W.  
Washington, DC 20005-3096  
Phone: 202.756.8000 NDM:MWE  
Facsimile: 202.756.8087  
Date: May 18, 2010

**Please recognize our Customer No. 53080  
as our correspondence address.**